

REMARKS

Claims 1-5, 7-10, and 12-14 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejection in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 3-4, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Broadbent, Jr. et al (U.S. Pat. No. 4,555,798) in view of Ferguson et al (U.S. Pat. No. 6,327,033). This rejection is respectfully traversed.

Claim 1 has been amended to recite a through hole examination method comprising a step of setting an examination range on a surface of a workpiece, wherein the workpiece includes a through hole. The method also comprises irradiating light from one side of the work piece having the through hole, wherein the through hole is located within the examination range. Passing light from another side of the work piece is detected with a sensor camera having a plurality of imaging elements, and the detected passing light is an image. The image is input into an image processing device, and pattern matching is then performed to determine if the imaged passing light matches the examination range. Then, the image is subjected to a binarization process to carry out image measurements. Subsequently, image processing is performed to determine whether the through hole contains a foreign matter. Lastly, claim 1 recites that the examination method is conducted by imaging with an imaging focal point of the sensor camera being shifted away from surface of the work piece at a distance greater than a focal length of the sensor camera. This subject matter is described in, for example,

paragraphs [0037] to [0040] of the present application. No new matter has been added. Neither Broadbent nor Ferguson teach or suggest such a method.

That is, neither Broadbent nor Ferguson teach or suggest a through hole examination method including steps of setting an examination range on a workpiece, performing pattern matching to determine if the imaged passing light matches the examination range, and subjecting the image to binarization to carry out image measurements. Because both Broadbent and Ferguson are silent with respect to these steps of the claimed invention, these steps are neither taught nor suggested. Accordingly, claim 1 and each corresponding dependent claim would not have been obvious.

Claims 2, 5-8, and 10-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Broadbent, Jr. et al (U.S. Pat. No. 4,555,798) in view of Ferguson et al (U.S. Pat. No. 6,327,033), and further in view of Onishi et al (U.S. Pat. No. 5,347,591). This rejection is respectfully traversed.

Claim 2 has been amended in a manner similar to claim 1. That is claim 2 has been amended to recite steps of setting an examination range on a workpiece, performing pattern matching to determine if the imaged passing light matches the examination range, and subjecting the image to binarization to carry out image measurements. As stated above, neither Broadbent nor Ferguson teach or suggest such a method. Onishi also fails to teach these steps. Because each of the cited references are silent with respect to these steps, the claimed method of claim 2 and each corresponding dependent claim would not have been obvious.

Claim 5 has been amended to recite a through hole examination apparatus comprising an image processing device. The image processing device sets an examination range on the surface of the workpiece, receives imaging signals provided by the sensor camera, conducts pattern matching to determine if the imaged passing light matches the examination range, subjects the imaged passing light to a binarization process to carry image measurements, and performs a process for comparing imaged areas to determine whether the through holes contain a foreign matter. None of the cited prior art references teach or suggest such a device.

More particularly, none of the cited prior art references teach or suggest an apparatus including an image processing device that is capable of setting an examination range on the surface of the workpiece, receiving imaging signals provided by the sensor camera, conducting pattern matching to determine if the imaged passing light matches the examination range, subjecting the imaged passing light to a binarization process to carry image measurements, and performing a process for comparing imaged areas to determine whether the through holes contain a foreign matter. Because none of the cited references, either singularly or in combination, teach or suggest such an apparatus, claim 5 and each corresponding dependent claim would not have been obvious.

Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

NEW CLAIMS

New claims 13-14 have been added. These claims are fully supported by the specification and drawings as originally filed. No new matter has been added. Specifically, these new claims are supported at paragraph [0038] of the specification.

None of the cited references teach or suggest the subject matter of claims 13 and 14. That is, none of the cited references teach or suggest a step of performing pattern matching that further comprises correcting a positional deviation of the examination range. Because this subject matter is neither taught nor suggested, claims 13 and 14 are in condition for allowance.

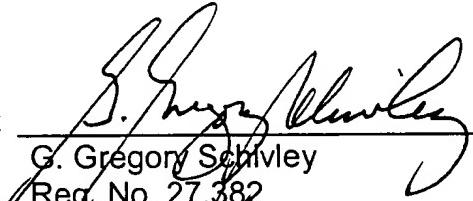
CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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